Comparison of Hypoxia Inducible Factor 1α (HIF-1α) levels in HCT-15 cell line and Human Colon Cancer Stem Cell-like Cells

Vergleich auf Hypoxia Inducible Faktor 1α (HIF-1α) spiegel zwischen HCT-15 Zell Linie und Human Dundarm krebs stem cell-like Zellen

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Aim

Hypoxia Inducible Factors (HIFs) are transcription factors that respond to decrease of oxygen level in the cellular environment. Three types of HIFs are known, HIF-1, HIF-2 and HIF-3. All HIFs are heterodimers consisted of α and β subunits. HIF signaling plays a central role in angiogenesis and in the regulation of human metabolism and HIF-1 specifically is responsible for cellular and systemic responses to hypoxia. HIF-1 consists of an α and a β subunit. HIF-1α is oxygen dependent and HIF-1β a constitutively-expressed aryl hydrocarbon receptor nuclear translocator (ARNT).

The aim of this study was to quantify and correlate the HIF-1α levels between Human Colon Cancer Cells and Human Colon Cancer Stem Cell-like Cells (Colon CSCs) growing in normal oxygen concentration and hypoxia.

Materials and methods

Growth curves were generated for three cultures, HCT-15, Colon CSCs growing at physiological O_2 concentration and Colon CSCs growing at absence of O_2. HIF-1α levels were quantified with both flow cytometry and Real Time PCR.

Results

Data were drawn and correlated between the three cultures. HIF-1α levels were higher in Colon CSCs than in HCT-15, both growing at physiological O_2 concentration. The HIF-1α levels of Colon CSCs growing at absence of O_2 are indicative of resistance to cell death cause of hypoxia after an adjustment period.

Conclusion

HIF-1 is expressed in most of the oxygen breathing animals and is responsible for cellular and systemic responses to hypoxia. It consists of two subunits (α and β). The α subunit is oxygen dependent and was quantified in HCT-15 cells and in Colon CSCs to investigate the percentage of metabolic changes that hypoxia promotes in Colon CSCs. The results indicate that Colon CSCs, which express higher levels of HIF-1α, have a higher angiogenic and metabolic profile than Colon Cancer Cells, both during normal O_2 concentrations and hypoxia.

References

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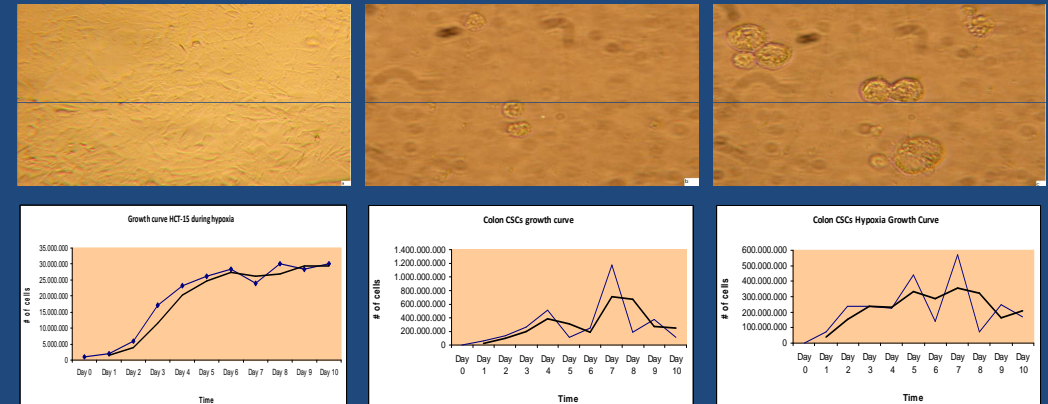
	HIF-1a rates from day to day (% of total events)		
	HCT-15 Hypoxia	**Colon CSCs**	**Colon CSCs Hypoxia**
Day 1	3,6	1,6	1,9
Day 3	26,9	2,5	1,7
Day 5	47,2	3	1,7
Day 7	49,6	4,6	5,4

Figures a, b, c represent cell lines HCT-15 (hypoxia), Colon CSCs (Normal O_2), Colon CSCs (Hypoxia) respectively. Underneath every figure there is the growth curve for each cell line.

The table above shows the percentage of HIF-1a expression measured with flow cytometry for the three cell lines. Colon CSCs during hypoxia express high HIF-1a levels (according to total number of cells for every cell line). As a result Colon CSCs can adjust to different O_2 concentrations.

Disclosure of Potential Conflicts of Interest

None of the authors of the above study has declared any conflict of interest

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